

WHAT IS CLAIMED IS:

1. A transfer seal for coupling a nozzle tip to a nozzle of an injection molding apparatus, said transfer seal comprising:

a retaining member removably connected to a downstream end of the nozzle, said retaining member having an inwardly directed retaining flange provided at a downstream end of said retaining member;

a sealing member having a mating flange sandwiched between said inwardly directed retaining flange and a step provided in the nozzle tip, said sealing member having a sealing face for abutting a surrounding wall of a mold cavity plate opening; and

wherein said retaining member is comprised of a first material and at least said sealing face of said sealing member is comprised of a second material.

2. A transfer seal as claimed in claim 1, wherein said first material and said second material are different.

3. A transfer seal as claimed in claim 2, wherein said first material is more thermally conductive than said second material.

4. A transfer seal as claimed in claim 3, wherein said first material is selected from the group consisting of: Beryllium-Copper, Copper Alloy, Beryllium-free Copper, TZM, Tungsten Carbide, Tool Steel, Hardened Steel, H13, AerMet<sup>TM</sup> 100 or 310 Alloys, Ampco<sup>TM</sup> and Stainless Steel.

5. A transfer seal as claimed in claim 4, wherein said second material is a thermal insulator.

6. A transfer seal as claimed in claim 5, wherein said second material is titanium.

7. A transfer seal as claimed in claim 5, wherein said second material is ceramic.

8. A transfer seal as claimed in claim 1, wherein an outer wall of said retaining member is threaded to mate with a threaded inner surface of the nozzle.

9. A transfer seal as claimed in claim 1, wherein an inner wall of said retaining member is threaded to mate with a threaded outer surface of the nozzle.

10. A transfer seal for coupling a nozzle tip to a nozzle of an injection molding apparatus, said transfer seal comprising:

a retaining member removably connected to a downstream end of the nozzle, said retaining member having a shoulder for abutting a first step provided in the nozzle tip and an inwardly directed retaining flange provided at a downstream end of said retaining member;

a sealing member having a mating flange sandwiched between said inwardly directed retaining flange and a second step provided in the nozzle tip, said sealing member having a sealing face for abutting a surrounding wall of a mold cavity plate opening; and

wherein said retaining member is comprised of a first material and at least said sealing face of said sealing member is comprised of a second material.

11. A transfer seal as claimed in claim 10, wherein said first material and said second material are different.

12. A transfer seal as claimed in claim 11, wherein said first material is more thermally conductive than said second material.

13. A transfer seal as claimed in claim 12, wherein said first material is selected from the group consisting OF: Beryllium-Copper, Copper Alloy, Beryllium-free Copper, TZM, Tungsten Carbide, Tool Steel, Hardened Steel, H13, AerMet™ 100 or 310 Alloys, Ampco™ and Stainless Steel.

14. A transfer seal as claimed in claim 13, wherein said second material is a thermal insulator.

15. A transfer seal as claimed in claim 14, wherein said second material is titanium.

16. A transfer seal as claimed in claim 14, wherein said second material is ceramic.

17. A transfer seal as claimed in claim 14, wherein an outer wall of said retaining member is threaded to mate with a threaded inner surface of the nozzle.

18. A transfer seal as claimed in claim 14, wherein an inner wall of said retaining member is threaded to mate with a threaded outer surface of the nozzle.

19. An injection molding apparatus comprising:  
a manifold having a manifold channel for delivering a melt stream of moldable material to a nozzle channel of a nozzle, said nozzle being received in a mold cavity plate opening;

a nozzle tip nested in a downstream end of said nozzle, said nozzle tip having a melt channel in communication with said nozzle channel for receiving said melt stream from said nozzle channel;

a mold cavity for receiving said melt stream from said melt channel of said nozzle tip through a mold gate;

a transfer seal having a retaining member and a sealing member for coupling said nozzle tip to said nozzle, said retaining member being removably connected to said downstream end of said nozzle and having an inwardly directed retaining flange, said sealing member having an outwardly directed mating flange that is sandwiched between said inwardly directed retaining flange and a step provided in said nozzle tip, a sealing surface of said sealing member abutting a surrounding wall of said mold cavity plate opening; and

wherein said retaining member is comprised of a first material and at least said sealing face of said sealing member is comprised of a second material.

20. An injection molding apparatus as claimed in claim 19, wherein said first material and said second material are different and said first material is more thermally conductive than said second material.

21. An injection molding apparatus as claimed in claim 20, wherein said first material is selected from the group consisting of: Beryllium-Copper, Copper Alloy, Beryllium-free Copper, TZM, Tungsten Carbide, Tool Steel, Hardened Steel, H13, AerMet™ 100 or 310 Alloys, Ampco™ and Stainless Steel.

22. An injection molding apparatus as claimed in claim 21, wherein said second material is a thermal insulator selected from the group consisting of: titanium and ceramic.

23. An injection molding apparatus as claimed in claim 19, wherein said step is inclined at an angle of less than 90 degrees relative to an axis of said nozzle channel.

24. An injection molding apparatus as claimed in claim 19, wherein said outwardly directed mating flange of said sealing member and said inwardly directed retaining flange of said retaining member are generally parallel and extend generally perpendicular to an axis of said nozzle channel.

25. An injection molding apparatus comprising:

- a manifold having a manifold channel for delivering a melt stream of moldable material to a nozzle channel of a nozzle, said nozzle having a threaded downstream end;

- a nozzle tip located adjacent said threaded downstream end of said nozzle, said nozzle tip having a melt channel in communication with said nozzle channel for receiving the melt stream from said nozzle channel;

- a mold cavity for receiving the melt stream from said melt channel of said nozzle tip through a mold gate;

- a transfer seal for securing said nozzle tip to said nozzle, said transfer seal having a retaining member for mating with said threaded downstream end of said nozzle, a shoulder for abutting at least a portion of an outer wall of said nozzle tip and a sealing member having a sealing face for abutting a cavity plate surrounding the mold gate;

- wherein an outwardly directed flange of said sealing member is sandwiched between an inwardly directed flange of said retaining member and a step provided in an outer wall of said nozzle tip.

26. An injection molding apparatus as claimed in claim 25, wherein said retaining member is comprised of a first material and at least said sealing face of said sealing member is comprised of a second material.

27. An injection molding apparatus as claimed in claim 26, wherein said first material and said second material are different and said first material is more thermally conductive than said second material.

28. An injection molding apparatus as claimed in claim 27, wherein said first material is selected from the group consisting of: Beryllium-Copper, Copper Alloy, Beryllium-free Copper, TZM, Tungsten Carbide, Tool Steel, Hardened Steel, H13, AerMet™ 100 or 310 Alloys, Ampco™ and Stainless Steel.

29. An injection molding apparatus as claimed in claim 28, wherein said second material is a thermal insulator selected from the group consisting of: titanium and ceramic.

30. An injection molding apparatus as claimed in claim 25, wherein said outwardly directed mating flange of said sealing member and said inwardly directed retaining flange of said retaining member are generally parallel and extend generally perpendicular to an axis of said nozzle channel.

31. An injection molding apparatus comprising:  
an injection manifold;  
an injection nozzle having an upper portion adjacent to the manifold and a lower portion adjacent to a mold cavity;  
a nozzle tip connected to the nozzle via a removable retaining member;  
a removable nozzle seal connected to the nozzle via said removable retaining member.

32. An injection molding apparatus according to claim 31, wherein said nozzle seal is less thermally conductive than said retaining member and the nozzle tip.

33. An injection molding apparatus according to claim 31, wherein said removable nozzle seal is a mold gate insert including a mold gate orifice.

34. An injection molding apparatus according to claim 31, wherein said nozzle tip and said retaining member are made of thermally conductive materials.

35. An injection molding apparatus comprising:  
an injection manifold;  
an injection nozzle having an upper portion adjacent to the manifold and a lower portion adjacent to a mold cavity;  
a nozzle tip disposed in the lower portion of the nozzle;  
a removable retaining member attached to the nozzle;  
a removable nozzle seal connected to the nozzle via said removable retaining member.

36. An injection molding apparatus according to claim 35, wherein said nozzle seal is less thermally conductive than the retaining member and the nozzle tip.

37. An injection molding apparatus according to claim 35, wherein said removable nozzle seal is a mold gate insert including a mold gate orifice.

38. An injection molding apparatus according to claim 35, wherein said nozzle tip and said retaining member are made of thermally conductive materials.

39. An injection molding apparatus according to claim 35, wherein said removable retaining member connects said nozzle tip to said nozzle.

40. An injection molding apparatus according to claim 35, wherein said nozzle tip is metallurgically bonded to said nozzle.